

# CS 2336 - Lab Assignment

## **LAB (100 POINTS)**

Complete the four problems below. NOTE: For this and all lab assignments you may **not** collaborate with anyone except the instructor, TA, or CSE help desk tutors when completing these assignments. You may also not include all or part of coded solutions developed by others in your submission.

Four .java files should be submitted in eLearning prior to 6:00 am Sunday September 14:

**NOTES:** Each program should include comments that explain what each block of code is doing. Additionally, the programs should compile without errors, and run with the results described in the exercise. The following deductions will be made from each exercise if any of the following is incorrect or missing:

- Proper formatting [5 points]
- Proper names for classes and variables [5 points]
- Comments [5 point]
- Program doesn't compile [10 points]
- Source code (java file) missing [20 points]
- Missing loop where a loop was required [5 points]

### **Problem 1: Number Pattern (20 points)**

Write a program called NumberPattern that will print/display the number pattern shown below. The pattern starts with 5, then 7. Determine the pattern to calculate the remaining numbers and write an algorithm in Java that prints the series up to the greatest value that is less than 500.

Your solution **MUST** use variables and a loop to calculate each of the numbers beyond the first two:

5 7 12 19 31 50 ...

### **Problem 2: World Population (25 points)**

During the 20<sup>th</sup> century, the population of the earth grew from 1.65 billion to 6 billion people. There are currently twice as many people on earth as there were in 1970. In mid-August 2014, the population of the earth was estimated to be approximately 7.2 billion people.

Using an annual growth rate of 1.5% per year, create a *Java Program* that prints the world population in 2014 and for each of the next 20 years. Warning: these numbers are too large to fit in an *int* variable.

YEAR	POPULATION
2014	7,200,000,000
2015	
...	
2034	

### Problem 3: Pancakes (25 points)

Grandma has an old family recipe for pancakes. She can make 8 pancakes that are each 10 inches in diameter. Grandma decided that the pancakes were way too large for her grandchildren and decided to make pancakes that were only 4 inches in diameter.

How many small pancakes will Grandma's recipe make?

**Hint:** Assume that the pancakes are all circular, and that the height of each pancake is the same, so you can just use the area of the circle to determine the amount of batter required. Area of a Circle =  $P * r * r$

Create a Java program that prompts for:

- ☐ Quantity of original pancake
- ☐ Diameter of original pancake
- ☐ Diameter of new pancake

Using the three supplied values, calculate the total quantity of pancakes that can be made using the new size.

**Tip:** You will need Math.PI for this problem.

```
Khan$ java Pancakes
Diameter of original pancakes (inches): 10
Quantity of original pancakes: 8
Diameter of new pancakes (inches): 4
Quantity of new pancakes: 50.0
```

```
Khan$ java Pancakes
Diameter of original pancakes (inches): 5
Quantity of original pancakes: 10
Diameter of new pancakes (inches): 10
Quantity of new pancakes: 2.5
```

**Problem 4: Box (30 points)**

Create a program named Box.java which prompts for an integer and prints an n by n square of asterisks, where n is the number that was entered. If the number entered is less than three or greater than 20, print the message "Bad value". The output should look like what is shown below:

```
Please enter a number: 30
Bad value!
Please enter a number: 8
Thank you. Here is your box!
```

```
*****
*       *
*       *
*       *
*       *
*       *
*       *
*****
```

**These solutions are due by 6:00AM on Sunday, September 14**